

# ENERGY: POWERED BY NORTH DAKOTA

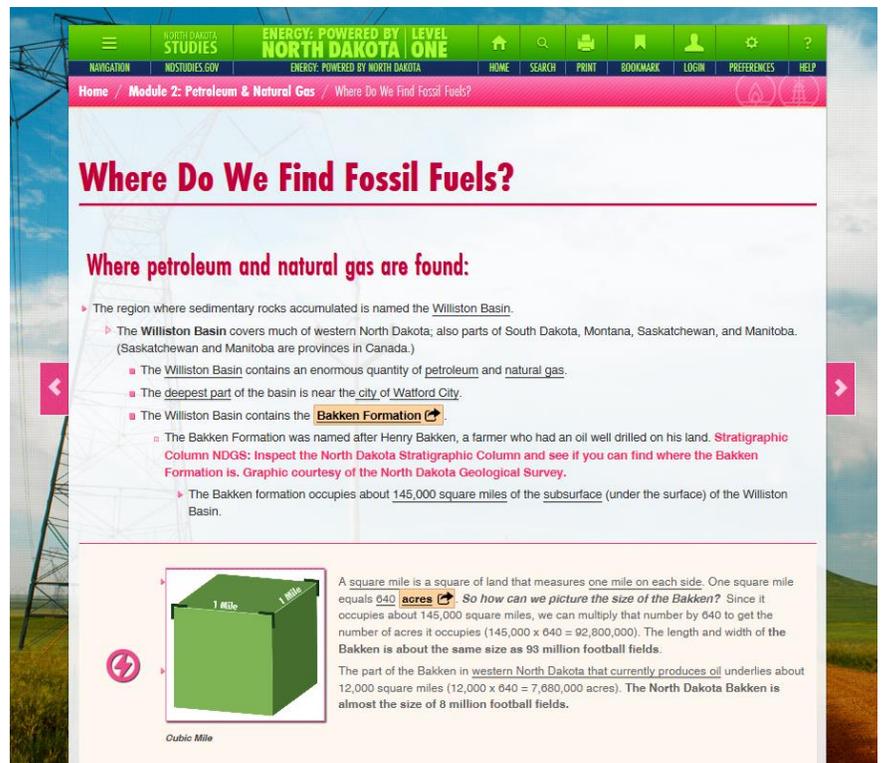
*North Dakota Energy Curriculum for 4<sup>th</sup> and 8<sup>th</sup> grade students*



NDstudies.gov

## THE PROJECT

A few years ago, the Workforce Subcommittee of the EmPower North Dakota Commission was brainstorming ways to engage North Dakota students regarding the abundant natural resources in the state and how they're used to create energy. The commissioners, appointed by the North Dakota Governor, represent all of the state's energy sectors and are keenly aware of the need to get students interested in energy and future career opportunities in the industry at an earlier age. The Subcommittee engaged a variety of stakeholders and found statewide support for the development of North Dakota-specific energy curriculum which focused on the state's natural resources. The avenue best suited to deliver educational energy content was found to be North Dakota Studies, a required course for both 4<sup>th</sup> and 8<sup>th</sup> grade students in the state.



The screenshot shows a web page with a green header containing navigation icons and the text 'ENERGY: POWERED BY NORTH DAKOTA LEVEL ONE'. Below the header is a pink navigation bar with the text 'Home / Module 2: Petroleum & Natural Gas / Where Do We Find Fossil Fuels?'. The main content area has a title 'Where Do We Find Fossil Fuels?' and a sub-section 'Where petroleum and natural gas are found:'. The text describes the Williston Basin and the Bakken Formation, including a diagram of a cubic mile and a comparison to football fields.

*A screenshot from Level 1 Petroleum and Natural Gas section of the energy curriculum.*

The purpose of the project was to provide the following benefits:

- Updated and online curriculum to include relevant information about N.D.'s robust energy resources in N.D. Studies courses in 4<sup>th</sup> and 8<sup>th</sup> grade.
- N.D. students and teachers have the opportunity to learn about energy through delivery of current curriculum, including the demonstration of relevancy to N.D.
- Teachers receive training on content and delivery of new curriculum and technology.
- Potential for mitigating the urgent workforce needs within the energy industry in N.D due to increased interest and understanding of energy industry and abundance of career options.
- Provides more educated citizens and contributors to N.D.'s future workforce.
- Supports Science, Technology, Engineering & Mathematics (STEM) emphasis.

## THE PROCESS

Engaging Bismarck State College's Great Plains Energy Corridor Director as project manager, two-week energy curriculum modules were created for both 4<sup>th</sup> and 8<sup>th</sup> grade North Dakota Studies courses, following social studies, science, and common core state standards. The Energy Corridor collaborated closely with the State Historical Society of North Dakota, which runs the North Dakota Studies program and also provides online curriculum. By partnering on the approach to web curriculum, the final product links several North Dakota Studies components together to make it more user-friendly for teachers.

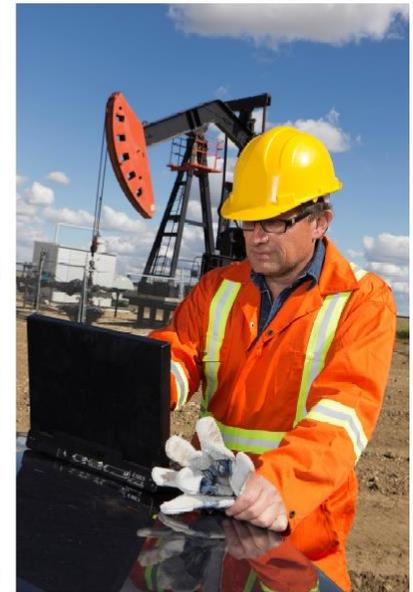
Each module includes three to five ready-made activities and quizzes for teachers to use with their classes that can be downloaded as a PDF or as a Microsoft Word document that can be adapted and tailored to fit the needs of the students. There is also a “Careers in Energy” section that provides a brief description of a variety of positions in the energy industry and links wage information and skills needed for future career opportunities.

The curriculum was funded through the North Dakota Industrial Commission’s Lignite Research and Oil and Gas Research Programs and matching donations from energy industry stakeholders. Stakeholders from the industry, including Marathon Oil, Whiting Petroleum, Tesoro Corporation, and the North Dakota Petroleum Council, provided more than \$150,000 worth of in-kind resources and media to make the online curriculum engaging and interactive. Videos, pictures, and maps bring the topic to life as students scroll through the different modules. Bismarck State College’s National Energy Center of Excellence also developed an animation that walks students through the steps needed to create electricity from a variety of natural resources found in North Dakota.

#### PETROLEUM PRODUCTION TECHNICIAN

**Job Description:** This position assists and provides technical assistance on oil and gas production related issues. The production technician implements production operational standards and coordinates data acquisition for the Production Engineer, Operations Manager, and Superintendent. He or she frequently travels to well locations and performs onsite supervision and monitoring and testing, and makes changes or adjustments to equipment. The technician also works closely with field operations personnel to coordinate needed changes; and communicates clearly with contract personnel during modification and/or adjustment of equipment. Job tasks also include:

- Supporting field personnel in managing the production data
- Compiling and forecasting production expense data
- Generating production graphs and analyzing production trends utilizing computer applications
- Participating in incident reviews and job safety analyses
- Helping to coordinate spill reporting and remediation
- Developing and adjusting procedures, policies, and operational guidelines



**Needed Skills and Education:** A person seeking this occupation should possess excellent oral and written communication, teamwork, and planning and organizational skills. He or she should have the ability to identify problems, generate novel approaches, and implement solutions. Computer proficiency is a must. Entry-level positions require a high school or GED diploma along with previous experience in related positions. An associate or bachelor degree in a related field is preferred, along with employment experience in oil and gas production. Community colleges and vocational-technical schools provide

*One selection from 25 different energy careers showcased on the energy curriculum website.*

## ACCOMPLISHMENTS

Since the curriculum’s launch in October 2014, use of the curriculum has continued to increase, with almost 14,000 sessions by 10,000 users in the most recent school year. The project manager continues outreach for the curriculum, touching more than 2,000 teachers at various state workshops throughout the year.

Enhancements have been made to the two-week curriculum, including:

- **Curriculum booklet:** A hands-on supplement was created and distributed to all North Dakota Studies teachers in the state. The material in the booklet complements the online content and



*A screenshot from the “About” section of the ENERGY: Powered by North Dakota curriculum.*

provides more opportunity for small-group work in the classroom. In addition, the curriculum booklets were modeled after the annual report of the Great Plains Energy Corridor so that teachers requesting new or replacement copies can have access to the most current material through the Energy Corridor office. This has aided in the sustainability of the project.

- **Two-week lesson plan packages for both Level One and Level Two:** Downloadable from the curriculum website are all the files needed for a complete two-week lesson in the classroom. Included in the files are daily activity guides, materials, standards, adaptations, and rubrics for assessments. Besides being available on the website as a free download, flash drives with the materials were also distributed to each North Dakota Studies teacher in the state.
- **Interactive Whiteboard Lessons:** Bismarck State College's Great Plains Energy Corridor partnered with the State Historical Society of North Dakota to link the State Museum Gallery experience with the classroom. A series of interactive whiteboard lessons were created that can be downloaded by teachers and also used in the galleries for visiting school groups. The series of lessons use games and interactivity to relate challenging concepts to students – such as the siting of pipelines. Many of the lessons use video clips and pictures of museum artifacts, for example, in the “Archaeology and Energy” lesson, students piece together geologic time and when fossil fuels were created in North Dakota.

Feedback for the curriculum has been consistently positive, and teachers have expressed gratitude for up-to-date and accessible materials on energy for the classroom, particularly with regards to oil and gas development in the state. Where much of the materials teachers said were found through internet searches and outdated books, they now have access to factual content on oil development in North Dakota.

Through this curriculum, students will have increased awareness of the energy resources that are right in their backyards. They will know the facts of energy development in North Dakota and be more informed citizens. It is the hope of the stakeholders that by learning about the energy industry at an earlier age, students will be more open to STEM courses throughout their education and be more prepared and interested in post-secondary technical training and careers.

The screenshot shows a curriculum page with a pink header containing navigation links: Home, Module 2: Petroleum & Natural Gas, and Where Petroleum and Natural Gas are Found. The main title is 'Where Petroleum and Natural Gas are Found' in red. The page contains several bullet points and two maps. The first map is a 'Williston Basin Map' showing the basin's location in western North Dakota, extending into South Dakota, Montana, and Saskatchewan. The second map is a 'Williston Basin Cross Section' showing geological layers. A small circular icon with a lightning bolt is visible in the bottom left corner of the page content.

Home / Module 2: Petroleum & Natural Gas / Where Petroleum and Natural Gas are Found

## Where Petroleum and Natural Gas are Found

- ▶ One of the regions where sedimentary rocks accumulated is named the **Williston Basin**.
  - ▶ The subsurface of the Williston Basin holds enormous quantities of petroleum and natural gas.
    - The deepest part of the basin is near the city of Watford City.
    - ▶ The Williston Basin contains the Bakken Formation, layers of rock containing oil that lie about 10,000 feet, or nearly two miles, below the surface.
- ▶ The **Bakken Formation** is an oil-rich rock unit occupying about 145,000 square miles, or 93 million acres, of the subsurface of the Williston Basin. **Stratigraphic Column NDGS: Inspect the North Dakota Stratigraphic Column and see if you can find where the Bakken Formation is.** *Graphic courtesy of the North Dakota Geological Survey.*
  - ▶ The Bakken was deposited about 360 million years ago.
  - ▶ The part of the Bakken located in North Dakota underlies about 12,000 square miles, or about 8 million acres.
    - The Bakken Formation was named after Henry Bakken, a Tioga, North Dakota farmer, who owned the land where the formation was first discovered.
- ▶ The **Three Forks** formation is an oil-rich rock unit found below part of the Bakken.
  - ▶ The Three Forks is thicker and broader than the Bakken and extends farther east in North Dakota than the Bakken.
    - The Bakken/Three Forks is about the same size as the state of West Virginia.
    - The United States Geological Survey (USGS) called the Bakken the largest continuous oil accumulation it had ever assessed.
      - The USGS estimates that with current technology, up to 7.4 billion barrels of oil could be extracted from the Bakken and Three Forks Formations.

Oil is measured in units called barrels. A barrel of oil is equal to 42 U.S. gallons. (The average gasoline tank on a car holds 12 to 16 gallons of fuel.) The abbreviation for barrels, when referring to oil, is **bbl**. In the 1860s, when oil production began (in Pennsylvania), many industries used 40-gallon barrels made of wood to ship their beer, whiskey, molasses, etc. By the early 1870s, Standard Oil Company began using 42-gallon barrels for transporting petroleum. In order to assure buyers that they were getting a full 42-gallon barrel, the oil barrels were painted blue. The abbreviation, **bbl** for **blue barrel** became the standard abbreviation for oil barrels. Oil has not actually been shipped in barrels since the introduction of oil tankers.

Williston Basin Map: The Williston Basin covers much of western North Dakota, also parts of South Dakota, Montana, Saskatchewan, and Manitoba. Map courtesy of North Dakota Studies.  
Map courtesy of North Dakota Studies.

Williston Basin Cross Section: This cross-section of the Williston Basin is to scale and was run from Beach to Fargo, N.D., along Interstate 94. Photo courtesy of the North Dakota Geological Survey.

*A screenshot from Level 2 Petroleum and Natural Gas section of the energy curriculum.*